

Alternative Technologies for Quantifying Paved Road Dust Emission Measurements

“On the road to clean air”

Commitment to Sample Paved Roads in the Las Vegas Valley

- The PM_{10} SIP contains a commitment to evaluate dust control effectiveness by performing quarterly paved road silt measurements through the year 2006
- Paved road silt loading measurements are used to calculate paved road dust (PM_{10}) emission rates

Paved Road Silt -101

- A sedimentary material consisting of very fine particles intermediate in size between sand and clay
- Dust on the roadway surface from a variety of sources:
 - Track-on from construction activity, vacant lots and unpaved roads
 - Material deposited by the wind
 - Material deposited and blown around by vehicle tires driving on the roadway surface

Issues With Paved Road Silt

- Airborne particles (silt) can be inhaled deeply into the lungs by humans and animals
- Can cause adverse health effects – breathing difficulties, trigger allergenic reactions, damages lung tissue, aggravates existing health problems
- Airborne particles (silt) can impair visibility locally and regionally (cause vehicle accidents through visual impairment)

Evaluation of Control Measure Effectiveness

- Street sweeping
- Street improvements
 - curbing
 - paving unpaved shoulders
 - paving unpaved roads
- Controlling the transport of dust from unpaved lots onto the paved roadway network
 - wheel shakers at construction sites
 - washing at entry and exit points
 - track-out cleanup

Why Mobile Technologies?

- An alternative method to silt sampling is desired that will allow measurement of paved road dust emissions over larger segments of the paved roadway network
- The alternative method will utilize vehicle-mounted samplers that will measure dust while the vehicle is driven on paved roads (doesn't shut down traffic)
- To characterize the PM_{10} (dust) real-time emissions on paved roads throughout the Las Vegas Valley more comprehensively and accurately

Benefits of Alternative Technologies - Mobile

- Faster, safer, and less labor intensive than traditional silt collection

AP-42 Silt Sampling

"The Old Way"



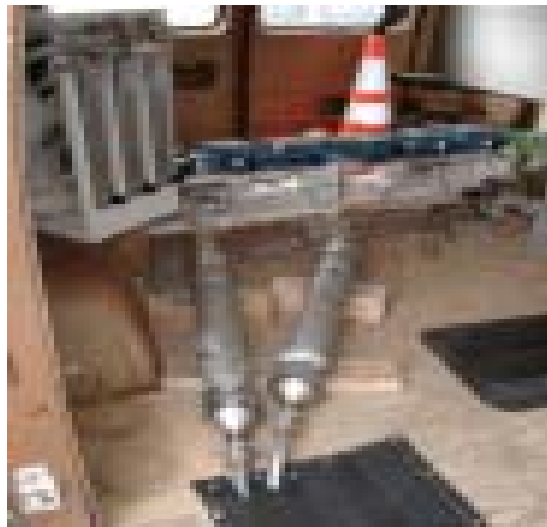
Benefits of Alternative Technologies – Mobile (cont'd)

- Can sample interstates, highways and roads of all classifications without shutting down traffic flow
- Can collect sufficient data to make defensible claims regarding:
 - Urban scale emissions
 - Control strategy effectiveness

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“TRAKER”

(Testing Re-entrained Aerosol Kinetic Emissions from Roads)



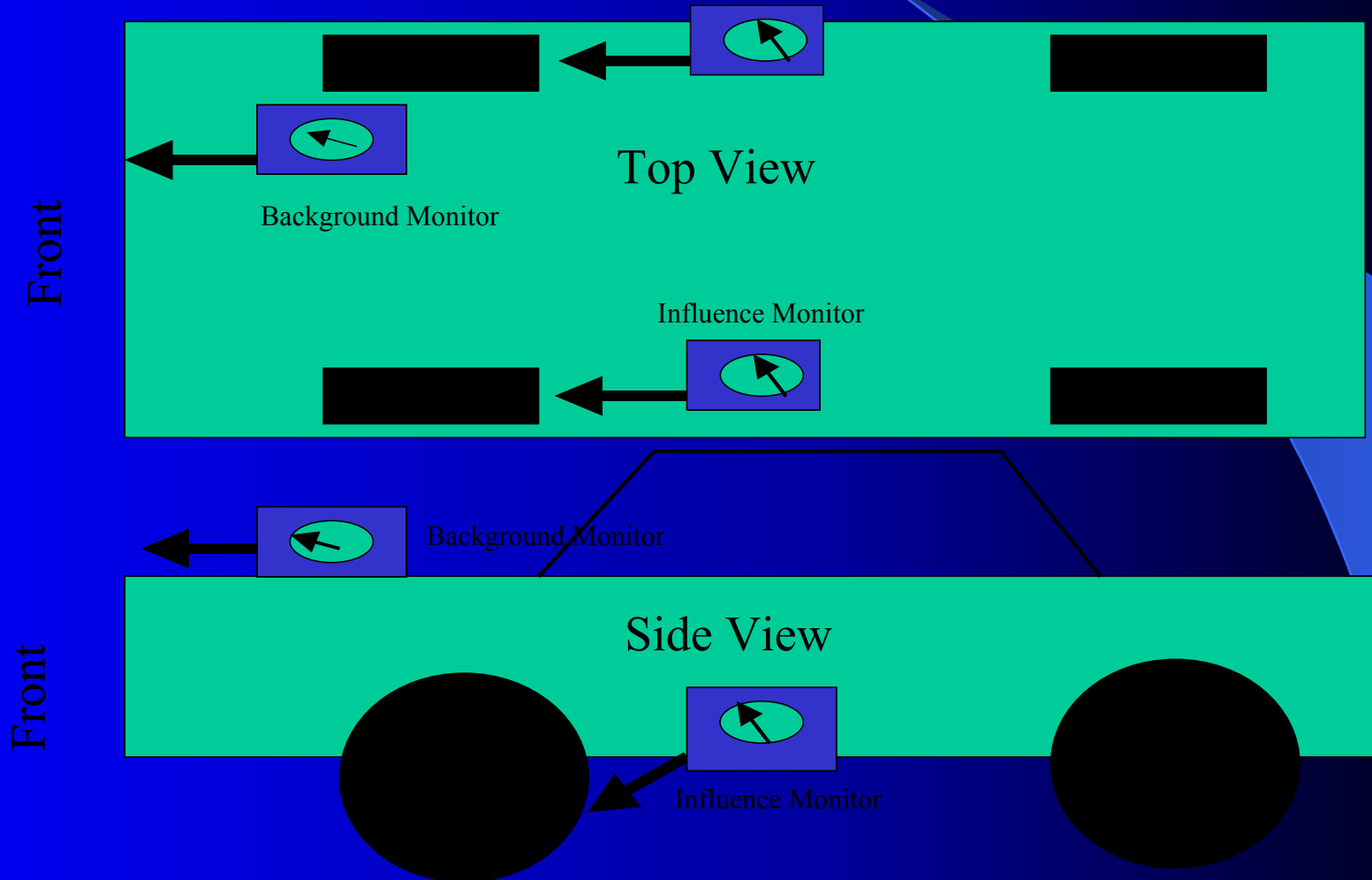
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“TRAKER” (cont’d)



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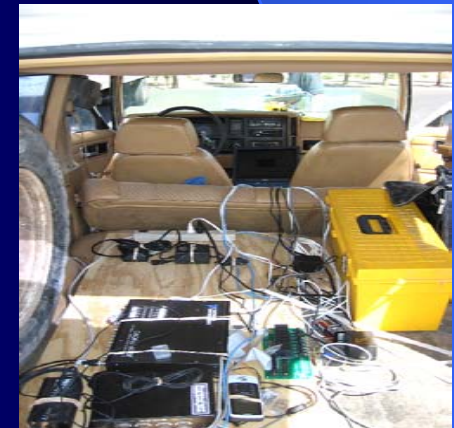
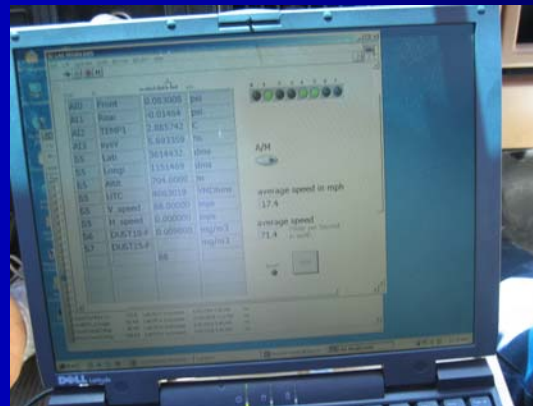
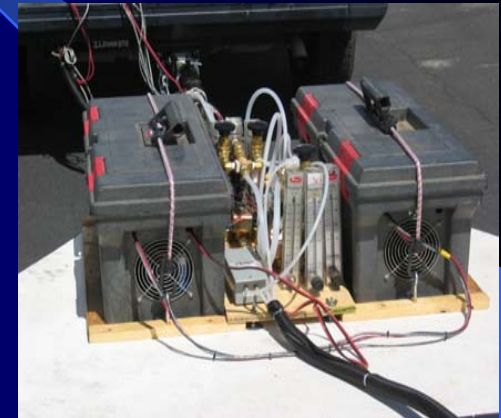
“TRAKER” (cont’d)



CE-CERT System

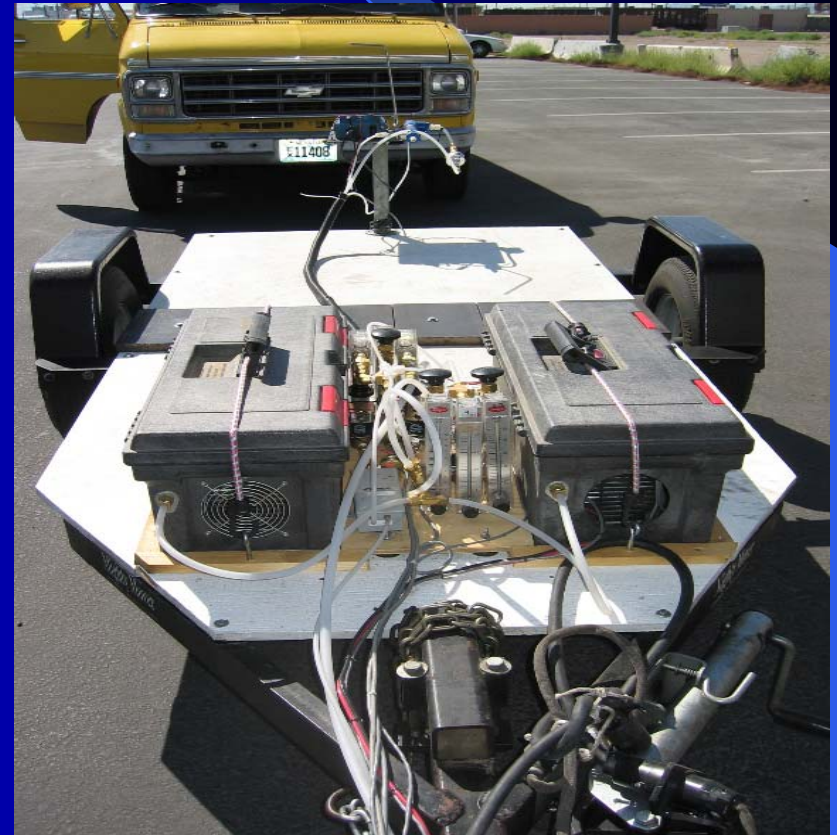
University of California Riverside – College of Engineering,
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(CE-CERT)



CE-CERT System

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CE-CERT System

University of California Riverside – College of Engineering, Center for Environmental Research and Technology (cont'd)



Mobile Technology Comparison

- TRAKER

- measures accurately on a wide range of speeds
- Accounts for background concentrations
- Sampling configuration
 - sampling points for road dust behind front wheels and on front bumper

- CE-CERT

- measures accurately on a wide range of speeds
- Accounts for background concentrations
- Sampling configuration
 - sampling points for road dust behind trailer and on front bumper of tow vehicle

Mobile Technology Comparison (cont'd)

- TRAKER

- Sampling array
 - Manifold setup for instrumentation (Dust TRAK)
- Vehicle configuration
 - Self-contained
 - Single-vehicle

- CE-CERT

- Sampling array
 - Direct instrumentation of samplers (Dust TRAK)
- Vehicle configuration
 - Trailer drawn unit

“Drive off” Testing Roadway Emissions



“Drive off” Testing Roadway Emissions (cont’d)



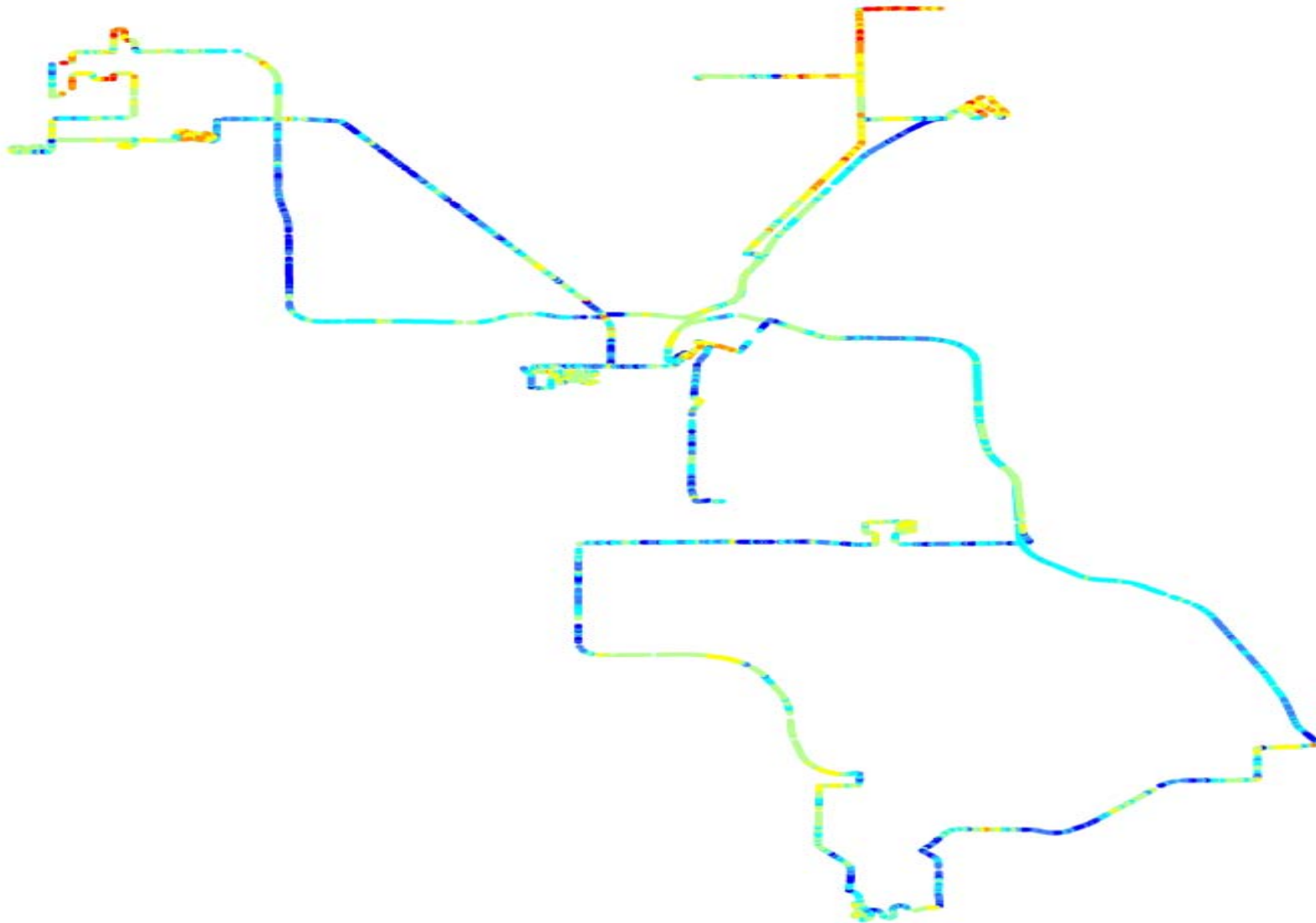
“Drive off” Testing Roadway Emissions (cont’d)



Drive Route Day 1



Drive Route Day 2



Drive Off Results

- Approximately 126 miles of paved roads evaluated in five hours
- Both mobile units produced similar results
- Areas of construction throughout the network, produced the highest emissions
- Compliance Officers can concentrate efforts in those areas to minimize PM₁₀ Emissions

Next Steps

- Choose a mobile technology and work with U. S. EPA to obtain approval for using the mobile technology
- Use mobile technology to perform the Quarterly Paved Road Sampling Commitment (PM_{10} State Implementation Plan requirement)
- Continue to develop data to support study (RTC/CH2MHill/DAQEM – Improved Paved Road Emissions Factor Equation)

QUESTIONS ?

Please Contact:

The Clark County Department
of Air Quality & Environmental
Management (DAQEM)

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